Section XI
Enrollment Projections

For this analysis, it was necessary to project the veteran enrollment from January 2002 for each month through FY 2022. Considerations in the enrollment rates included the continued enrollment of Enrollee Pre veterans, historical enrollment patterns, changes in the overall veteran population and expected veteran mortality. These rates were developed by geographic area, Priority Level, Enrollee Type, and Age Group. Enrollees were projected for each Facility, county, Priority Level, and Enrollee Type by age and gender.

Veteran enrollment from October 1998 through December 2001 was provided by VA. This file included all veterans currently enrolled, all those enrolled at sometime and now deceased, and all those currently seeking care, but not enrolled (so called "cost-only" veterans). VHA Office of Policy & Planning (OPD) performed all significant data-scrubbing tasks before delivering the final enrollment file.

The veteran Enrollee projections for each fiscal year were performed separately for Enrollee Pre, Past Enrollee Post and New Enrollee Post. Enrollee Pre is defined as those enrollees who used the VA health care system during FY 1996, FY 1997, or FY 1998. Past Enrollee Post are those enrollees who did not use the VA health care system during FY 1996, FY 1997, or FY 1998 and first enrolled during FY 1999. New Enrollee Post are all other enrollees.

First, the Enrollee Pre, Past Enrollee Post and New Enrollee Post veterans were identified from the December 2001 enrollment file. Additional enrollment of Enrollee Pre and New Enrollee Post veterans by Facility were calculated separately through FY 2022 at various enrollment rates by county, Priority Level, and Age Group. The age of each Enrollee was increased by one year each fiscal year. Monthly enrollments were reduced for expected deaths based on an adjusted version of the 1969-1971 U.S. Life Principal Mortality tables for Males and Females, Whites and Non-Whites. The tables were adjusted to reflect actual Enrollee death rates by Priority Level observed during the first half of FY 2000. This adjustment was necessary since populations with higher morbidity rates (e.g., Priority Levels 1 and 4) theoretically would have higher mortality rates. This was found to be true when the death rates of Enrollees were examined.

An enrollee who is enrolled for the entire fiscal year has 12 member months and the total cost of providing health care to this enrollee during the fiscal year is 12 × PMPM cost associated with this

enrollee. An enrollee who is first enrolled four months into the fiscal year will only have 8 member months during the fiscal year. The total cost of providing health care to this enrollee during the fiscal year is 8 × PMPM cost associated with this enrollee. Therefore, projecting enrollment by month during the fiscal year allows for the calculation of total fiscal year costs associated with enrollees who receive benefits during a portion or all of the fiscal year. The total member months times the PMPM cost is the total expected health care cost of the enrollment group during a fiscal year. The average enrollment during a fiscal year is derived by dividing the number of projected member months by 12.

Enrollment Projection Methodology

The number of veterans enrolling each month was calculated using the following formula:

number of new enrollees = rate of enrollment × size of pool.

While details and definitions will be provided in subsequent paragraphs, the concept behind the methodology is straightforward: given a certain number of veterans eligible to enroll (but not yet enrolled) at the beginning of the month (the "pool"), and given that a certain proportion of the pool enrolls each month (the "rate of enrollment"), then the number of new enrollees is, by definition, the product of this rate and pool size.

The remaining paragraphs of this section detail and justify the methods used to determine the component parts of the above equation. Given that the number of new enrollees was determined for each single-year age group, for each gender, for each Priority Level, for each Enrollee Type, for each county in the country, and for each month of each year through 2022, the simplicity of the above equation is deceiving.

Definitions

The goal of this enrollment projection is to estimate enrollment at the level of detail described above (i.e., by single-year age, gender, Priority Level, Enrollee Type, county, and month). Recall that there are nine Priority Levels (1a, 1b, 2, 3, 4, 5, 6, 7a, and 7c described in Exhibit XI-1) and two general Enrollee Types (Enrollee Pre and Enrollee Post). The *Pre Pool* denotes those veterans classified as Enrollee Pre, who are eligible to enroll, but have yet to enroll. The *Post Pool* is defined analogously.

These pools are recalculated at the beginning of each month. It should be noted that the enrollment projections were constructed assuming that no enrollees would "disenroll" or migrate between Priority Levels. Recall that the population of Enrollee Pre veterans is a fixed group (i.e., no veterans can enter this group). Therefore, at a national level, the Pre Pool is decreasing each month due to the forces of enrollment and mortality. On the other hand, certain segments of the Post Pool may increase depending on the number of new veterans resulting from active duty separation.

Enrollment estimates are calculated at various levels of detail beyond Enrollee Type (e.g., by age, gender, Priority Level, and geographic region). The term "pool" is used to refer to any group of veterans that are eligible to enroll but have yet to enroll. The precise definition of "pool" depends upon the context of the discussion, or the term may be used in a generic way in order to describe the projection methodology.

As indicated in the introduction, the monthly *rate of enrollment* is defined as the proportion of the pool that enrolls during the month. Besides conducting calculations based on Priority Level and Age Group, enrollment rates will be calculated on a national level (*national rate*), a state level (*state rate*), and a county level (*county rate*). The *final rate* applied to a pool of veterans in a particular county is a credibility adjusted average of the national, state, and county rates.

The VA *market share*, which is defined as the proportion of the veteran population that is enrolled, is a concept that should not be confused with the rate of enrollment used in the present projections. There are no explicit assumptions contained in the present methodology about future total enrollment or future trends in market share; rather, the total enrollment and market share projections are the result of the underlying propensity of veterans in various circumstances to enroll. The calculation of enrollment rates is an attempt to capture this propensity to enroll.

VetPop Projection

The enrollment projection relies on projections of veteran population. VetPop projections obtainable directly from VA were not at the necessary level of detail. The following discussion describes the method used to project the veteran population to FY2022 for each age, gender, priority, and county. The geographic regions covered by the projection are the 50 states, District of Columbia, Puerto Rico, and "other" (referred to as "overseas").

VetPop Data Sources

The following files were received from VA:

- *Allstates_h*
- *VetPop 3.06*
- *Dec-01 Master Enrollment File*
- *Users96-98*

These data sources are described in more detail in the following subsections.

Several Census Bureau tables were examined in order to facilitate the distribution of Priority Level 4 and 5 veterans to single-year ages.

- *Americans with Disabilities: 1997 – Table 1.*
- *CPS Detailed Poverty Tables: 2000 P60 Package – Table 2.*

These sources are discussed in more detail in the sections concerning the allocation of Priority Level 4 and 5 veterans.

Allstates_h

VHA Office of Policy and Planning created *Allstates_h* in August 2001. This data provides annual VetPop projections to FY2010 at the following level of detail:

- Age detail: three age bands – under 45, 45 – 64, and 65 and over;
- Priority Level detail: 1a, 1b, 2 – 6, 7a, and 7c;
- Geographic detail: 5-digit zip code (not used) and county (no overseas data);
- Gender detail: none.

The *Allstates_h* VetPop projection for FY2000 was considered the most reliable estimate for Priority Levels 1a, 1b, 2, 3, 4, and 5. The projections beyond FY2000 relied upon the best available data at the time the projections were made. Since the time these projections were made, however, more credible data has become available. Moreover, certain simplifying assumptions were used that may

have been acceptable for a ten-year projection but would not be acceptable for the present 20-year projection.

Therefore, the present VetPop projection was balanced to *Allstates_h* totals (by age group and state) for FY2000 for Priority Levels 1a, 1b, 2, 3, 4, and 5. *Allstates_h* projections for subsequent years were not used in this analysis.

VetPop3.06

VetPop3.06 was received in February 2002. This data was originally provided in two separate data sets *spvpd* and *vp2001*. The file *spvpd* was separated into two files called *NATIONAL* and *STATE*, while *vp2001* will be referred to as *FIPS* in the following discussion.

The *NATIONAL* file provides annual VetPop projections to FY2030 at the following level of detail:

- Age detail: single-year ages;
- Priority Level detail: none, but does contain disability percentages;
- Geographic detail: national (includes overseas data);
- Gender detail: yes.

The *STATE* file provides annual VetPop projections to FY2030 at the following level of detail:

- Age detail: single-year ages;
- Priority Level detail: service-connected/non-service-connected;
- Geographic detail: state (includes overseas data);
- Gender detail: yes.

The *FIPS* file provides annual VetPop projections to FY2025 at the following level of detail:

- Age detail: single-year ages except 85 and over are combined into an "85+" age group;
- Priority Level detail: none;
- Geographic detail: county;
- Gender detail: yes.

Dec-01 Master Enrollment File

The *Dec-01 Master Enrollment File* contains enrollment totals as of December 31, 2001. This file was obtained from VA in June 2002. These totals are at the finest level detail (i.e., single-year age, priority, county, and gender). Three counties incorrectly contained no enrollment data (Meigs

County in Tennessee, Foard County in Texas, and Lexington City in Virginia). Therefore, to maintain consistency between VetPop and enrollment projections, VetPop data for those three counties was combined with data for adjacent counties (McMinn County in Tennessee, Knox County in Texas, and Rockbridge County in Virginia, respectively).

Users96-98

The *Users96-98* file defines the Enrollee Pre veterans and, hence, the Pre Pool. Much of the discussion in the next several subsections does not apply to Enrollee Pre veterans because these veterans are explicitly listed in the *Users96-98* file.

VetPop Methodology

Priority Levels 1a, 1b, 2, and 3 by age and gender, at the national level

The *NATIONAL* file was processed to obtain totals for FY2000 where disability percentages were allocated to Priority Levels 1a, 1b, 2, and 3 as follows:

- 10% - 20% ↔ Priority Level 3;
- 30% - 40% ↔ Priority Level 2;
- 50% - 60% ↔ Priority Level 1b;
- 70% - 100% ↔ Priority Level 1a;
- 0% ↔ allocated to Priority Levels 4, 5, 6, and 7 at later stage.

Because *Allstates_h* totals were considered more reliable for FY2000, the above totals for FY2000 were scaled to match FY2000 *Allstates_h* totals (by age group and priority). The same scaling factor was used for subsequent years so that the relative changes in veteran population implied by the *NATIONAL* data were retained in the present projection.

To summarize the processing of *NATIONAL* described thus far:

- Disability percentages were mapped to Priority Levels 1a, 1b, 2, and 3;
- FY2000 *NATIONAL* totals for the above priorities were scaled so that they matched the corresponding FY2000 totals from *Allstates_h*;
- The same scaling factors calculated above were used for all subsequent fiscal years of *NATIONAL* data for the above priorities.

The number of veterans in all other priorities (4 – 7) combined was determined by subtracting the numbers found above from the original composite totals obtained from the *NATIONAL* data set. Therefore, the totals (for each age and gender) from the *NATIONAL* data set retain their original values.

For the sake of simplicity, the processed data obtained above shall continue to be referred to as *NATIONAL*. This file now contains the number of veterans in Priority Levels 1a, 1b, 2, 3, and 4 – 7 (combined) for each age and gender, for each year of the projection.

Note that the *Allstates_h* file did not contain data on overseas veterans, therefore *Allstates_h* was augmented by data from *NATIONAL* and *STATE* prior to the above scaling operation as follows: the number of service-connected overseas veterans was taken from the *STATE* file; then, the allocation of those veterans to the four priorities (and to 0% disability), was determined by the *NATIONAL* distribution.

In theory, for each age and gender, the priority allocation of veterans within each state could proceed in a manner similar to what was done above for the overseas veterans; that is,

- Reduce the number of service-connected veterans by the estimated proportion (from *NATIONAL* data) having 0% disability; then,
- Allocate the remaining service-connected veterans in each state to Priority Levels 1a, 1b, 2, and 3 in the same proportions that they are allocated by the *NATIONAL* data.

The first step is straightforward, but, because of data anomalies, the second step proved to be rather complicated. This allocation to the individual states is described in the next subsection.

Priority Levels 1a, 1b, 2, and 3 by age, gender, and state

As was done for the *NATIONAL* data, the *STATE* data was processed so that the FY2000 totals agreed with *Allstates_h*. First, the service-connected totals for each age, gender, and fiscal year supplied by *STATE* were adjusted to correspond to the service-connected veterans from *NATIONAL* with more than 0% disability. The service-connected totals for FY2000 were then scaled to match the sum of Priority Levels 1a, 1b, 2, and 3 totals from *Allstates_h* for each age group and state. These same scaling factors were applied to all subsequent years of the projections. For the sake of simplicity, these reduced and scaled totals shall be referred to as the service-connected totals from *STATE*.

An allocation procedure involving veterans is needed because it is not known beforehand into which "bucket" (defined by age, gender, priority, and county) to place the veterans. But, this information is known for enrollees (actually, it is known for enrollees and other users during FY1996 – FY1998; but, for simplicity, these veterans shall be referred to as "enrollees"). Therefore, it is reasonable that an allocation procedure be applied only to the pool (i.e., the non-enrolled veterans) rather than to veteran totals, which include enrollees. Therefore, enrollee totals for each priority and state were subtracted from *NATIONAL* and *STATE* FY2000 veteran population estimates to arrive at pool estimates corresponding to the *NATIONAL* and *STATE* data. Mortality was applied to this enrollee population to arrive at pool estimates for subsequent years. The remaining discussion in this subsection applies to the allocation of these pools.

In order to understand the next stage of the process it may by helpful to visualize the pool data in terms of a rectangular array (matrix) of entries. Each age, gender, and fiscal year has its own matrix, so, for example, there is a matrix of 52 year-old male veterans in FY2004. Each matrix has 53 rows, one for each "state" (50 states, District of Columbia, Puerto Rico, and overseas); and 4 columns, one for each priority (Priority Levels 1a, 1b, 2, and 3).

At the beginning of this stage, the only data available is the sum of each row (i.e., the pools from the *STATE* data); and the sum of each column (i.e., the pools from the *NATIONAL* data). The goal of the process employed here is to allocate the state pools to the priorities in the same proportions that the national pool is allocated to the priorities (or, equivalently, the priority pools would be allocated to the states in the same proportions that the national pool is allocated to the states). To see a mathematical view of this allocation, let s_i be the size of the pool for state i (i.e., the sum of row i entries in the hypothetical matrix), and let p_j be the size of the pool for priority j (i.e., the sum of the column j entries). Then the size of the pool allocated to state i and priority j, denoted by a_{ij}, is given by the following:

$$a_{ij} = \frac{s_i \times p_j}{T}, \text{ where } T = \sum_i s_i \left(= \sum_j p_j \right).$$

This is straightforward enough, except that for some age-gender-fiscal year matrices, several of the s and p terms are negative (i.e., enrollment exceeds the number of veterans). Because applying the above formula for negative values of s and/or p can produce nonsensical results, an adjustment of the above formula was required. (Note that for some counties the Pre Pool population defined by *Users96-98* appeared unreasonably large relative to veteran population estimates and were therefore capped. This process helped eliminate some of the anomalous data.)

If, for a given age, gender, and fiscal year, the enrollment E_j exceeds VetPop V_j for priority j (i.e., p_j is negative), then

$$a_{ij} = \frac{e_{ij} \times p_j}{E_j}, \text{ where } E_j = \sum_i e_{ij},$$

where e_{ij} is the known enrollment in state i and priority j. The above allocation implies that for a given age, gender, fiscal year, and priority where the number of enrollees exceeds the number of veterans, the veterans (and, hence, the negative pool of veterans) is allocated to the states in proportion to their enrollment in the states.

Not too much should be read into this allocation scheme. It applies only to those age-gender-fiscal year-priority combinations where the data indicates that there is a negative pool. Various allocation schemes were applied to the negative pools. The common problem associated with the schemes that were ultimately abandoned was that they allocated veterans in such a way that negative pools were created in priority-state combinations where neither the priority pool nor the state pool was negative to begin with. Clearly, a negative pool is the result of data anomalies; the goal was to limit the spread of the anomalies. The scheme ultimately adopted satisfied the goal of limiting anomalous outputs (negative entries in the matrix) to only those rows and columns where there were anomalous inputs to begin with.

The above process describes how to handle the entries in a column of a matrix where the column sum was negative. The remaining steps of the allocation process described in this subsection apply only to that part of the matrix that is remaining. Hence, the pool for a given state s_i is adjusted (increased) so that only entries associated with positive values of p_j are considered. Unfortunately, some negative state pools were encountered even after removing negative priority pools from consideration. The allocation to a row with a negative pool sum (i.e., where s_i is negative) proceeds in a manner completely analogous to the method applied to columns with negative pool sums (i.e., where p_j is negative). The mathematical expression describing this process is

$$a_{ij} = \frac{e_{ij} \times s_i}{E_i}, \text{ where } E_i = \sum_j e_{ij}.$$

The same considerations for handling anomalous inputs as were discussed above apply to the choice of this allocation scheme.

Finally, after removing the anomalous (negative sum) rows and columns from the matrix and adjusting the remaining row sums (s_i) and column sums (p_j) accordingly, the originally mentioned allocation formula is used to allocate the pools to each priority-state combination (a_{ij}):

$$a_{ij} = \frac{s_i \times p_j}{T}, \text{ where } T = \sum_i s_i \left(= \sum_j p_j \right).$$

Priority Level 4 by age, gender, and state

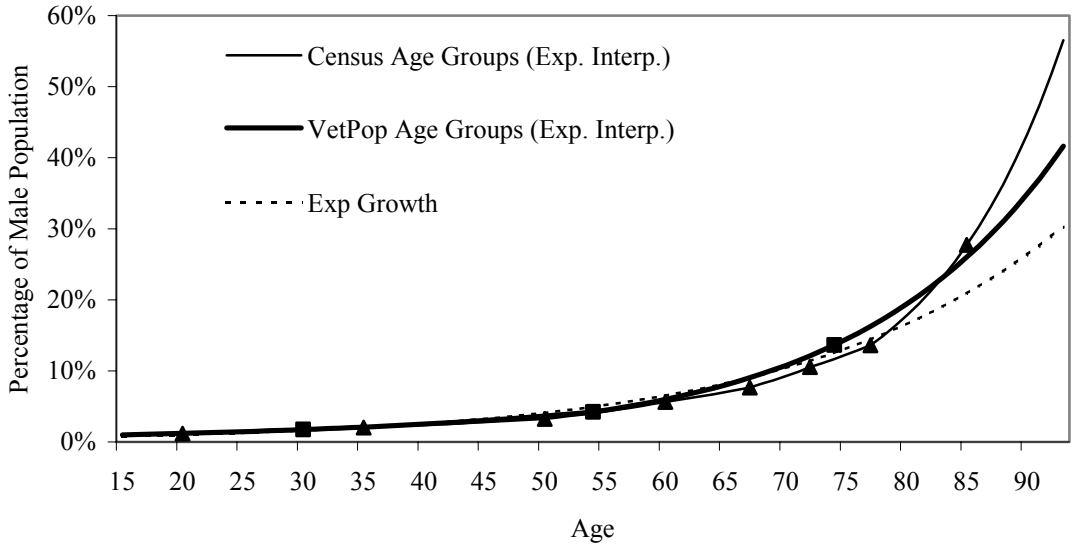
As was done for Priority Levels 1a, 1b, 2, and 3, it is assumed that *Allstates_h* has the correct number of Priority Level 4 veterans in FY2000 (for each age group and state). But, unlike the prior allocation process, there is no credible data indicating how the number of Priority Level 4 veterans will evolve over the projection period.

The allocation of veterans to Priority Level 4 is based on the assumption that the proportion of Priority Level 4 through 7 veterans that are Priority Level 4 is a function of age and state (but constant with respect to time). Therefore, as the age distribution changes within a state, the proportion of Priority Level 4 through 7 veterans that are Priority Level 4 will change in that state.

Census data was examined (*Americans with Disabilities: 1997 – Table 1*) in order to determine the functional relationship between age and the proportion of the population with disabilities (in particular, those classified as "needs assistance").

Figure XI-1 below summarizes the information obtained from that table. Census data was obtained for eight age groups (marked by triangles) and the solid curve connecting those points was constructed by exponential interpolation (extrapolation on the ends). Because *Allstates_h* provides age data in terms of three age groups, the census data was summarized similarly. The bold curve connecting the census data summarized by the three age groups (marked by squares) was also constructed by exponential interpolation (extrapolation on the ends). For reference, the dashed curve represents the least squares exponential curve for the census data (summarized by VetPop age groups).

Figure XI-1: Disabled Male Population (Census Data)

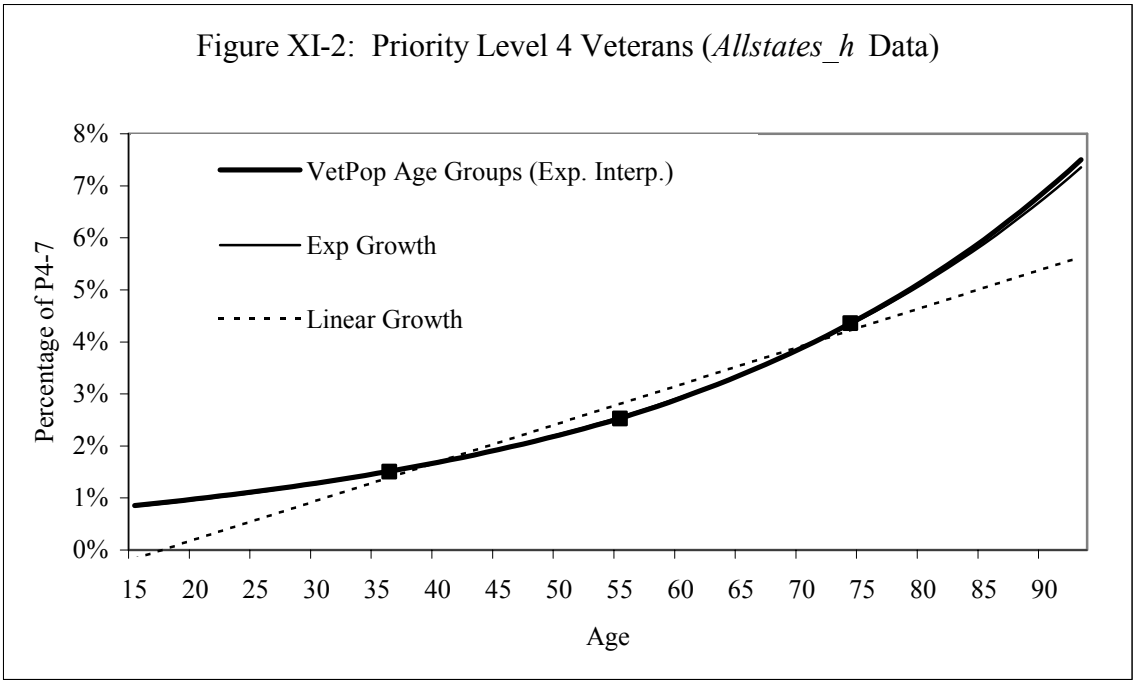


The preliminary conclusion drawn from this data is that the proportion of the population classified as disabled is approximately an exponential function of age, with the proportions for the higher ages appearing to exceed exponential growth.

A more accurate relationship between the proportion of the Priority Level 4 through 7 veteran population in Priority Level 4, can be obtained by looking directly at the FY2000 *Allstates_h* data. This data is summarized in Figure XI-2. The bold curve connects the data points for the three age groups (marked by squares) by exponential interpolation (extrapolation on the ends) and the solid curve is the least squares exponential curve for this data. The two curves are almost indistinguishable. For reference, the dashed line represents the line of best fit.

Figure XI-2 represents FY2000 *Allstates_h* data at the national level. Based on this data alone, it appears that a simple exponential fit would be adequate to map the age group data to single-year ages. However, the census data indicates that, for a particular state, the proportion of Priority Level 4 veterans may exceed exponential growth for higher ages. Therefore, exponential interpolation was chosen as the method to map FY2000 *Allstates_h* data single-year ages.

Figure XI-2: Priority Level 4 Veterans (*Allstates_h* Data)



Simply taking the composite proportions for each age group and applying exponential interpolation would not necessarily result in the correct proportion for each age group. Therefore, the iterative process described below was used:

- Assign proportions to each of the three age groups (at the average age for each age group)
- Apply exponential interpolation to map proportions to each single-year age
- Compare age group composite proportion based on mapping to actual age group composite proportion
- Adjust proportions assigned to each age group based on the comparison above

This iterative process was repeated more than 25 times for each state. This produced results that were in agreement with FY2000 *Allstates_h* data for each age group and state. Because there was no *Allstates_h* data for overseas veterans, the lowest proportion for each age from among the state data sets was used for overseas veterans. This assumption is consistent with the notion that disabled veterans are less likely to live overseas.

Priority Levels 5, 6, and 7 by age, gender, and state

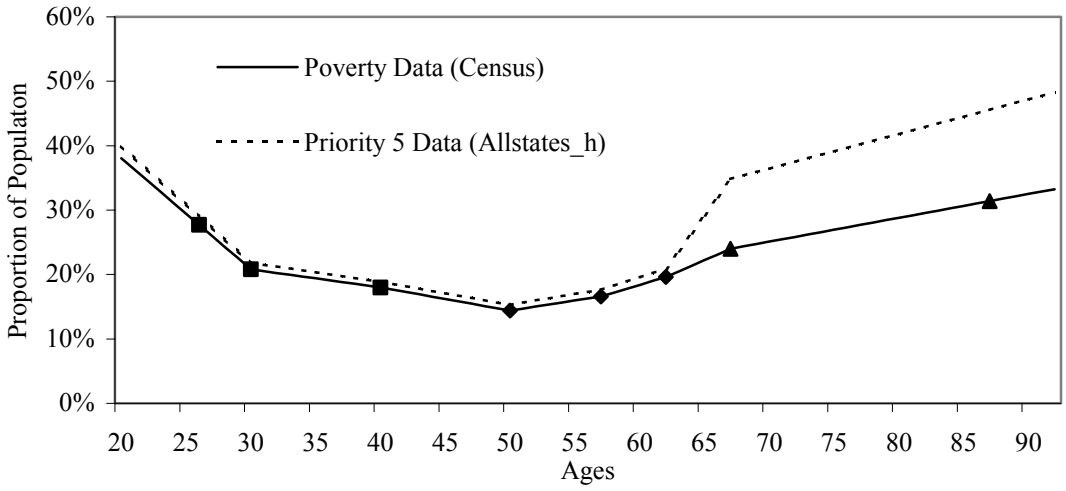
The next step is to determine the proportion of Priority Level 5 through 7 veterans that are Priority Level 5. Again, it is assumed that *Allstates_h* has the correct number of Priority Level 5 veterans in

FY2000 (for each age group and state). The method used to determine the proportion for each single-year age is similar to that described above for Priority Level 4 veterans.

Analogous to the situation for Priority Level 4, the procedure for Priority Level 5 veterans is based on the assumption that the proportion of the Priority Level 5 through 7 veterans that are Priority Level 5 is a function of age and state (but constant with respect to time). Census data was examined (*CPS Detailed Poverty Tables: 2000 P60 Package – Table 2*) in order to determine the functional relationship between age and the proportion of the population living in poverty (in particular, males classified as "under 1.85").

Figure XI-3 below summarizes the information obtained from that table. Census data was obtained for eight age groups and the solid curve connecting those points was constructed by linear interpolation (extrapolation on the ends). The census data points were grouped according to FY2000 *Allstates_h* age groups – under 45 marked by squares, 45-64 marked by diamonds, and 65+ marked by triangles.

Figure XI-3: Poverty vs. Priority Level 5



The process of mapping the census data to priority projections was performed by iteratively translating the sets of points corresponding to each age group so that the composite age group proportions matched FY2000 *Allstates_h* data. For example, suppose that the *Allstates_h* data indicates that for a particular state in FY2000, the proportion of Priority Level 5 through 7 veterans in Priority Level 5 for each of the three age groups was 22%, 17%, and 39%, respectively. If the census data points applied to Priority Level 5 through 7 veterans in that state resulted in proportions

of 21%, 16%, and 27%, for each age group respectively, then each census data point would be adjusted accordingly (by 22/21, 17/16, and 39/27, respectively).

The result of this hypothetical first iteration is indicated by the dashed line in Figure XI-3. Several iterations are necessary because composite age group proportions will likely still fail to match FY2000 *Allstates_h* data after only one adjustment. Proceeding in this manner, however, will produce results that are consistent with FY2000 *Allstates_h* data. Over 20 iterations were performed for each state. The proportions used in the hypothetical example given above were, in fact, the initial estimates for national level data when testing this model for assigning proportions to single-year ages.

Because FY2000 *Allstates_h* does not contain data for overseas veterans, the composite results at the national level were used for overseas veterans. In addition, proportions for veterans under 18 years old were set equal to the proportion for 18 year-old veterans established by the linear extrapolation process. Likewise, the proportion for veterans over 85 was set equal to the proportion for 85 year-old veterans.

All Priority Levels (6 and 7 combined) by age, gender, and county

This stage of the process will combine:

- The results of the prior stage – the number of veterans by single-year age, gender, priority (6 and 7 combined), state, and fiscal year;

with:

- The *FIPS* file – the number of veterans by single-year age (ages 85+ rolled up), gender, county, and fiscal year;

to create:

- The number of veterans by single-year age, gender, priority (6 and 7 combined), county, and fiscal year.

This process mirrors that described in the subsection "Priority Level 1a, 1b, 2, and 3 by age, gender, and state," except with "counties" replacing "states," and all priorities (with 6 and 7 combined) replacing Priority Levels 1a, 1b, 2, and 3 in the description. Moreover, the level of detail for each matrix is age (with 85+ ages rolled up), gender, state, and fiscal year; instead of just age, gender, and fiscal year.

The initial discussion presented here concerns those pools of veterans less than 85 years of age. Each age, gender, state, and fiscal year has its own matrix. Each matrix has one row for each county in that state; and 7 columns, one for each priority (Priority Levels 1a, 1b, 2, 3, 4, 5, "6&7").

At the beginning of this stage, the only data available is the sum of each row (i.e., the pools from the *FIPS* data); and the sum of each column (i.e., the pools from the prior stage of the process for each state). The goal of the process employed here is to allocate the county pools to the priorities in the same proportions that the state pool is allocated to the priorities (or, equivalently, the priority pools would be allocated to the county in the same proportions that the state pool is allocated to the county). To see a mathematical view of this allocation, let f_i be the size of the pool for county i (i.e., the sum of row i entries in the hypothetical matrix), and let p_j be the size of the pool for priority j (i.e., the sum of the column j entries). Then the size of the pool allocated to county i and priority j, denoted by a_{ij}, is given by the following:

$$a_{ij} = \frac{f_i \times p_j}{T}, \text{ where } T = \sum_i f_i \left(= \sum_j p_j \right).$$

This is straightforward enough, except that for some age-gender-state-fiscal year matrices, several of the f and p terms are negative (i.e., enrollment exceeds the number of veterans). Because applying the above formula for negative values of f and/or p can produce nonsensical results, an adjustment of the above formula was required.

If, for a given age, gender, state, and fiscal year, the enrollment E_j exceeds VetPop V_j for priority j (i.e., p_j is negative), then

$$a_{ij} = \frac{e_{ij} \times p_j}{E_j}, \text{ where } E_j = \sum_i e_{ij},$$

and e_{ij} is the known enrollment in county i and priority j. The above allocation implies that for a given age, gender, state, fiscal year, and priority where the number of enrollees exceeds the number of veterans, the veterans (and, hence, the negative pool of veterans) is allocated to the county in proportion to their enrollment in the county.

This scheme was adopted for precisely the same reasons that the analogous scheme was adopted to allocate Priority Levels 1a, 1b, 2, and 3 to the states (see the discussion beginning on page 124 for details).

The above process describes how to handle the entries in a column of a matrix where the column sum was negative. The remaining steps of the allocation process apply only to that part of the matrix that is remaining. Hence, the pool for a given county f_i is adjusted (increased) so that only entries associated with positive values of p_j are considered. Unfortunately, some negative state pools were encountered even after removing negative priority pools from consideration. The allocation to a row with a negative pool sum (i.e., where f_i is negative) proceeds in a manner completely analogous to the method applied to columns with negative pool sums (i.e., where p_j is negative). The mathematical expression describing this process is

$$a_{ij} = \frac{e_{ij} \times f_i}{E_i}, \text{ where } E_i = \sum_j e_{ij} .$$

Finally, after removing the "negative" rows and columns from the matrix and adjusting the row sums (f_i) and column sums (p_j) accordingly, the originally mentioned allocation formula is used to allocate the pools to each priority-county combination (a_{ij}):

$$a_{ij} = \frac{f_i \times p_j}{T}, \text{ where } T = \sum_i f_i \left(= \sum_j p_j \right).$$

For veterans 85 and older, an adjustment to the above method was necessary because the *FIPS* data rolled-up those veterans 85 and older. For these veterans, the approach is similar to that described above. Each matrix is at the gender-state-fiscal year level of detail rather than the age-gender-state-fiscal year level of detail; and there are 252 columns for each matrix (corresponding to each priority-age combination for ages from 85 through 120) rather than just the 7 priority columns. Otherwise the method described above applies to these veteran pools as well.

Priority Levels 6, 7a, and 7c

After applying the above steps to determine the number of Priority Level 1a, 1b, 2, 3, 4, and 5 veterans, the number of Priority Level 6, 7a, and 7c veterans (in aggregate) can be determined by comparing the above totals to the totals given by *VetPop3.06*. This subsection describes how the number of Priority Level 6, 7a, and 7c veterans are separated out of this aggregate total.

Before describing this process it should be noted that enrollment projections assume that Priority Level 6, 7a, and 7c veterans enroll from a common pool. The main reason for this assumption is the lack of credible data concerning an accurate allocation of veterans to Priority Level 6.

The enrollment projections assumed that Priority Level 6, 7a, and 7c veterans enroll from a common pool. Suppose that Priority Level 6 veterans enrolled at a rate of R_6 and that Priority Level 7a and 7c veterans enrolled at rates of R_{7a} and R_{7c}, respectively, from this common pool of size P. Hence the number of enrollees for each of these priorities is $R_6 \times P$, $R_{7a} \times P$, and $R_{7c} \times P$. Equivalently, the pool could be allocated so that their respective pool sizes are $\frac{R_6}{R_6 + R_{7a} + R_{7c}} \times P$, $\frac{R_{7a}}{R_6 + R_{7a} + R_{7c}} \times P$, and $\frac{R_{7c}}{R_6 + R_{7a} + R_{7c}} \times P$; where all three priorities enroll at the rate $R = R_6 + R_{7a} + R_{7c}$. This is how the Priority Level 6, 7a, and 7c veterans were separated out. Hence, the Priority Level 6, 7a, and 7c veterans are allocated from the Priority Level 6, 7a, and 7c aggregate based on the assumption that these priorities enroll at an equal rate.

The Priority Level 6, 7a, and 7c veterans are allocated from the Priority Level 6, 7a, and 7c aggregate veterans in order to simplify the calculations involved in the enrollment projection process. The number of veterans assigned to these priorities individually is not intended to represent the actual number of veterans in these priorities.

Conclusion

Reconstructing a new VetPop involves the straightforward task of adding enrollment as of December 31, 2001 (from *Dec-01 Master Enrollment File*), reduced by mortality projections for subsequent years, to the pools constructed above. In aggregate, these totals should closely approximate *NATIONAL*, *STATE*, and *FIPS* totals.

Data Sources for Calculating Enrollment Rates

The enrollment rates used in the present projection are identical to those used in the previous year's projection. The following discussion repeats many of the considerations originally presented.

VetPop Data

Allstates_h was the most credible VetPop projection available, at the level of detail required, when enrollment rates were calculated.

Enrollment and User History

When enrollment rates were calculated, the available history of VA enrollment and use since 1996 was contained in several enrollment and user files. Separately, each file contained a large number of enrollee or user records with missing or unreliable field entries (e.g., age, date of enrollment, Priority Level, and gender). The problems remained, even in aggregate; but, by combining information from several files for a single enrollee or user where possible, and by randomly assigning field entry values according to national distributions, a reasonably complete and accurate picture of past enrollment and use was pieced together.

Active Duty Loss File

The Active Duty Loss File (*ADLoss* file) provided by VA presents data on veterans who separated from active duty from 1970 to 1999. Representatives of VA indicated that this data was incomplete in that it did not represent all separated personnel. Therefore, the data was used to analyze trends rather than to determine rates of enrollment used in calculations. In particular, the ADLoss data was used to evaluate the retirement status of veterans (it was the only data available containing information on retirement status), the age distributions of recently separated veterans, and enrollment trends over time for specific cohorts of veterans (it was also the only file available containing information about specific veterans who have not had contact with the VA health care system).

Enrollment Rate Methodology

Rate Calculation

Enrollment rates were calculated for each of the thirteen months from April 2000 through April 2001. The Post Pool size was determined by subtracting the total number of veterans already enrolled or ineligible to enroll from VetPop given by *Allstates_h*. The Pre Pool size was determined by subtracting the number of enrolled Pre User from the total number of Pre Users. Separate rates were calculated for each Priority Level, Age Group, and User Type. At the national level it was clear that these rates were relatively constant over time. Therefore, the enrollment rate for a particular Priority Level, Age Group and User Type was chosen as the average of the monthly rates. Since enrollment rates were calculated for each of nine Priority Levels, three Age Groups, and two User Types, there were 54 separate national rates calculated ($9 \times 3 \times 2$).

Fifty-four separate rates were also calculated for each of the fifty states, District of Columbia, and Puerto Rico. Moreover, rates were also calculated at the county level. The final rates used for a particular county were adjusted based on the credibility of the data for that county. The credibility adjustment was performed by taking a weighted average of the county rate and the state rate. If the county rate was considered fully credible, then the final rate used for that county was based solely on county data. If the county rate had no credibility, then the final rate for that county was set equal to the state rate.

The level of credibility determined by the data for a particular county is based, in large part, on the size of the pool in that county; the smaller this size, the less credible are the rates derived from this data. In some cases, due to internal contradictions contained in the data provided by VA, the number of veterans in a particular county who are eligible to enroll is negative (i.e., there are more enrollees than there are veterans). In those cases, the county data (resulting in rates that are either negative or greater than 100%) is given no credibility and the corresponding state rate is used.

Time Factor

The inclusion of a time factor addresses the question of how the passage of time affects the probability that a veteran will enroll. A reasonable assumption is that if a veteran has not enrolled in the past year (or month), then there is less of a chance that the veteran will enroll in the next year (or month). One justification for this assumption is that as a veteran's active duty experience becomes more distant, the probability that the veteran will partake in opportunities related to their military service will decrease. One way to model this phenomenon is by including a multiplicative exponential decay factor in the enrollment rate calculations.

This enrollment projection update has provided the first opportunity to quantify the above phenomenon based on actual enrollment data. Due to the lack of enrollment data, prior projections were forced to rely on reasonable assumptions rather than empirical evidence.

Separation data from the *ADLoss* file, in concert with enrollment data, was used to analyze enrollment patterns of recently separated veterans. A cohort of veterans was defined by the month in which they separated. Several cohorts of recently separated (since 1998) veterans were established in this way. The enrollment patterns for each of these cohorts was similar: the rate of enrollment increased rapidly for the first two or three months after separation followed by what appeared to be a sharp decline in the enrollment rate which leveled off within about 18 months. The sharp increase then decrease in enrollment rate is referred to as an enrollment spike.

The data appears to support the conclusion that enrollment rates level off to some constant positive value. Since the long-run enrollment rate for any cohort appears to be constant, there was no need to model long-term enrollment behavior with an exponential curve. Moreover, by developing enrollment rates for a particular age group, those rates will change over time due to enrollment spikes only if the proportion of recently separated veterans in each age group changes over time. The proportion of recently separated veterans in each age group was projected using the *ADLoss* data and by assuming that recent separation trends would apply to the foreseeable future. These projections indicated that the proportion of recently separated veterans in each age group will not change appreciably.

In conclusion, the data on recently separated veterans indicates that applying a time factor to enrollment rates is unnecessary. It should be noted that there may be long run trends that are impossible to detect until more time has passed. This impact on enrollment behavior should be evaluated again in subsequent enrollment projections.

Factors Impacting Enrollment

A distinct enrollment rate is determined for each Priority Level, Age Group, and User Type. All three of these factors have a significant impact on enrollment rates. As the veteran demographic make-up changes relative to these three categories, the overall rates of enrollment will also change.

Time

How the probability of enrollment changes relative to the time since enrollment was made available has already been discussed. This "time factor" is real but appears to be short-lived and captured in the other parameters already used for enrollment rate calculations.

Gender

One method that would create separate rates for males and females would be to determine a base rate and then apply (multiplicative or additive) gender factors. One reason that this method was not used is that a single factor relating male and female enrollment rates did not appear reasonable based on the data. It appeared that for some Priority Levels and Age Groups, females had a higher market share than males, whereas for other Priority Levels and Age Groups, females had a lower market share than males.

Another option would be to calculate separate enrollment rates from scratch. This was not done partly because the small population of females for a given age, Priority Level, and state (or county) would not provide credible enrollment rates. Another practical reason for not employing this option was that there was no VetPop data that provided gender information at the age and Priority Level. Hence, it was not feasible to uncouple gender from age and Priority Level in terms of its impact on enrollment.

The question remains: Is there a difference between the rate of enrollment for males and females? Although there were no statistical methods employed to address this question specifically, a casual observation of the evidence does not suggest an obvious difference in enrollment rates based on gender alone. The following discussion relates primarily to Under Age 45 veterans, where the number of females is significant.

An example of data that would indicate conclusively that, for example, females are more likely to enroll than males, would be the enrollment of females in all Priority Levels in higher proportions than occurred in the general population. This does not occur. What is typical, however, is that the proportion of enrollees that are female in some Priority Levels is greater than the proportion of females in the general veteran population and, in other cases, the proportion is smaller. Therefore, any aggregate enrollment figures that might indicate that females enroll to a greater or lesser degree than do males may be the result of the distribution of females among the Priority Levels or the fact that female veterans are on average younger (as a whole and within each Age Group), rather than the result of an actual significant difference between the enrollment rates between females and males.

Retirement Status

It seems reasonable that a veteran's retirement status would impact the probability of enrolling. The *ADLoss* file was the only source containing information about retirement status and veteran age. No information was available relating retirement status and Priority Level. From the files available, it appeared that the proportion of veterans in a given Age Group who are retired will not change appreciably within the timeframe of these projections. This conclusion was based on the assumption that the distribution of retirees among recently separated veterans would hold for veterans separating in the future. Due to the above conclusion, there was no need to explicitly determine the impact of retirement status on the enrollment behavior of veterans.

Migration

Migration has a major impact on veteran population levels in various regions of the country. This effect is documented in *VetPop3.06*. Similarly, migration will impact enrollment levels. It appears reasonable that enrollees are less mobile than the general veteran population. Because of the difficulty in determining the migration patterns of enrollees relative to the general veteran population, the enrollment projection methodology implicitly assumes that enrollees do not migrate. It should be noted that there is no data available that addresses enrollee migration.

Socio-Economic Conditions

The methodology implicitly assumes that local factors contributing to enrollment rates will not change. In other words, any changes in socio-economic conditions that may influence enrollment rates on a national, regional, or local level are not considered. Whatever national and local factors, other than demographic make-up of the veteran population, that have determined the relatively constant enrollment rate for the thirteen month period from April 2000 to April 2001 are assumed to remain relatively constant for the duration of the projections. As these conditions change, enrollment patterns are bound to change accordingly.

Veteran Attitudes Toward VA

What was said for socio-economic conditions may also be said for the veteran's attitudes towards VA. Any possible changes caused by VA public relations efforts or news outside of VA's control may impact enrollment levels. In particular, an increase or decrease in VA marketing efforts may have a profound impact on enrollment levels.

Conclusion

Given the data available and the assumptions outlined above, every effort was made to arrive at a best estimate for future enrollment. Like any projection, even when all of the assumptions are correct and all of the data is perfect, there will be variation from actual results. It should be noted that VetPop projections used here were derived from VA VetPop projections (*VetPop3.06* and *Allstates_h*). If there are substantial errors in these VetPop projections, they will be reflected in the enrollment projections derived from them.

It is impossible to determine how world events will unfold. Those events that impact our economy and the use of our military may have a profound impact on actual enrollment.

Exhibit XI-1
Priority Level Descriptions

Level	Description
1	Veterans with service-connected conditions rated 50 percent or more disabling.
	Priority Level 1a
	Veterans with service-connected conditions rated 70 percent or more disabling.
	Priority Level 1b
	Veterans with service-connected conditions rated 50 to 69 percent disabling.
2	Veterans with service-connected conditions rated 30 to 49 percent disabling.
3	Veterans who are former POWs.
	Veterans who are Purple Heart recipients.
	Veterans with service-connected conditions rated 10 to 29 percent disabling.
	Veterans discharged from active duty for a disability incurred or aggravated in the line of duty.
	Veterans awarded special eligibility classification under 38 U.S.C., Section 1151.
4	Veterans who are receiving aid and attendance or housebound benefits.
	Veterans who have been determined by VA to be catastrophically disabled.
5	Non-service-connected veterans and service-connected veterans rated 0 – 9 percent disabled, whose income and net worth are below the established dollar thresholds.
6	All other eligible veterans who are not required to make co-payments for their care, including:
	World War I and Mexican Border War veterans.
	Veterans solely seeking care for disorder associated with exposure to a toxic substance, radiation, or for disorders associated with service in the Persian Gulf.
	Compensable zero percent service-connected veterans.
7	For purposes of this study, Priority Level 7 was split into two subgroups:
	Priority Level 7a
	Zero percent non-compensable service-connected veterans with income and net worth above the statutory threshold and who agree to pay specified co-payments.
	Priority Level 7c
	Non-service-connected veterans with income and net worth above the statutory threshold and who agree to pay specified co-payments.